

search light which renders them visible is an invaluable assistant. A year ago some accounts were published relative to the cloud effects on Mount Low and Pasadena. According to these accounts Mount Low is about 15 miles north-north-east from Los Angeles and about 6 miles in a straight line from Pasadena. When the beam of light fell upon the bodies of clouds they at once became luminous, so that all the details of motion were visible; when the beam fell upon the falling rain the great cone of light glowed like molten metal. Distant clouds moving up the canyons were searched out and made to glow as if in the midday sunshine. It seems as if the formation and motion of fog and cloud at nighttime could be advantageously studied by means of the search light. The height at which fog first forms, and its gradual extension upward and downward during the night, would be a very interesting and profitable investigation.

#### WATERSPOUTS OFF LONG ISLAND.

On April 9 when the schooner *George M. Grant* was within a few knots of Montauk Point, the sea, which had been heavy all along the Long Island coast from Fire Island, rapidly became the roughest that Captain Pelton had ever seen. It was about eight bells, or 4 p. m., and thick weather had prevailed all day. During a temporary lift in the clouds Captain Pelton and his crew saw ahead four immense waterspouts. Three of them were at a comfortable distance, but the fourth passed by to starboard not an eighth of a mile from the schooner. Captain Pelton says that the noise made by the spout as it whirled by the vessel was like that made by an immense corn-sheller.

#### WATERSPOUT, CLOUDBURST, OR TORNADO.

These three terms are often used indiscriminately when it would be easy to make a clear distinction between them. The *Cleveland World* of April 1 reports that "a waterspout on March 31 at Pana, Ill., threw a train of five cars and engine from the track of the Illinois Central." It does not appear likely that the damage here mentioned was done by wind; we may, therefore, infer that we have not to do with a tornado. A waterspout at sea is, according to all established usages in the English language, a different phenomenon from a heavy rain. Rain often accompanies a waterspout, but is not the prominent and characteristic feature. In the present case there could have been no waterspout properly speaking because the phenomenon occurred over the dry land of the interior of the continent. The daily weather map shows that the conditions were favorable for the formation of severe rains, thunderstorms, cloudbursts, and possibly tornadoes over Illinois on the afternoon of March 31; in fact a tornado was reported in Arkansas, but not waterspouts properly so-called. The use of the word "waterspout," when the writer really means only a heavy rain and wind, is not to be recommended. Such rains and winds are characteristic of thunderstorms and so-called "cloudbursts." In the present case it is likely that rain did not alone do the damage that is reported; a flooded track and a strong current of water would be needed to throw an engine from the track, or possibly the flood caused by the rain had undermined the track and thus indirectly caused the derailment. In general, in such cases as this it would be more proper to omit the words "waterspout" and "cloudburst." If the train was thrown from the track, or lifted from the track, as the headlines of the above article had it, this must have been due to a severe storm, but certainly not to a "waterspout" properly so called.

#### THE CHARACTER OF THE SKYLIGHT.

It is generally recognized that the influence of the sunlight and diffused skylight on the assimilation and growth of plants is brought about, first, by the heat that warms the earth and promotes the rise of the sap and, second, by the

chemical action that is brought about by certain portions of the solar spectrum or more properly by radiations of specific wave lengths which fall upon the leaves of the plants and determine the formation of chlorophyll. When plants are cultivated under the influence of artificial lights, or in portions of the earth where the sunlight is obscured by cloud and fog, their development is usually slower, and they often-times fail altogether to produce a satisfactory sap or crop, or mature seed. This failure is reasonably attributed to the nature of the light and especially to the relative abundance of the radiations that produce favorable chemical changes as compared with those that produce undesirable changes. Any investigation into the influence of climate on plants and crops and any effort to cultivate plants by artificial light must take into account the relative energies transmitted in different portions of the spectrum. This distribution of energy with wave length is extremely irregular when the flame is produced by burning simple substances, as is shown by the fact that the spectrum is generally a series of alternating bright and dark or warm and cold spaces, but is much more regular when the radiation emanates from incandescent masses of solids before they evaporate into the gaseous condition. The distribution of energy throughout the spectrum is also greatly affected by the reflection from any surface; especially is this true in the case of the blue light of the sky, which is apparently a species of selective reflection from the minutest particles of aqueous vapor and which, notwithstanding its visual feebleness, is yet a matter of the greatest importance to agriculture. The total amount of energy received by any plant from the whole vault of the blue sky will in hazy weather equal that received directly from the sun and in the case of a thin layer of cloud or fog when the sun is invisible and the direct radiation therefore zero, the indirect diffused radiation may still be a large quantity. This latter consideration suffices to explain why many plants flourish in a foggy and cloudy climate and in shady places where the direct sunlight never penetrates.

The total energy involved in the molecular vibrations that constitute radiation is not shown by its effect in producing light or heat or chemical actions; these are but some of the modes in which a portion of that energy becomes appreciable to us. This radiant energy is conveyed from point to point by the mediation of the ether, and the ether can only become appreciated by its action on the so-called ponderable matter. It is probable that the energy involved in the movements of the ether is far greater than that which is made measurable by its visual, chemical, or thermal results, for there are still other results accomplished by it, as shown by the phenomena of electricity, magnetism, and gravitation.

The following table is quoted from a paper in the *Annalen der Physik und Chemie*, Vol. LIII, by Koettgen, who has measured the relative intensity of the light in the different parts of the spectrum from a large variety of lamps and burning substances. Her measures of the sunlight and skylight particularly interest the meteorologist and agriculturist. They were made in the first half of August, 1893, near Berlin, Germany, in latitude N. 52°. At this season and place the maximum midday altitude of the sun varies from 56° on August 1 to 52° on August 15. The measurements were made by directing the vision toward the blue skylight at a considerable altitude above the horizon, and probably in the northern portion of the sky, although that is not specifically stated. The results are given in the first column. When directed toward an overcast sky covered by an apparently uniform thickness of cloud, the measurements given in the fourth column were obtained, and when directed toward the shining white side of a cumulus cloud, those in the fifth column. When directed toward the sun itself, the measurements given in the sixth and seventh columns were obtained. The figures given in